# Web-Based Countrywide Resources Planning System with the Centralized Support of National Mapping Center

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## *ABSTRACT*

*The paper discuses a specific area of the information gathering and processing – at the boundary between military and civilian usage. Crisis management is important for both areas, increasingly in the current situation of asymmetric threat and terrorist activities. The availability of resources is one of a key needs for the crisis management. The system ARGIS, described here, represents a part of the information support of the countrywide crisis management system, providing the function of an "information pump" to the responsible staff at various command level in the country. The system is based on a loose reporting structure, based mainly on the rules defined by the legislation and on the activities of the bodies acting in the crisis management. The ARGIS users have a detailed country maps available as a service of a "State mapping centre". All the services of the system are supplied as web-based application, with no specific requirements to the users (except a security ones). The base of the system has been in operation since the year 2001.*

## FOREWORD

There is a specific area of activities at the military-civilian boundary - Crisis management. In the current period of asymmetric threats, where, besides the "classical" risks of natural and industrial catastrophes, we must count with hostile acts of terrorists, the importance of a co-operation between military and civilian areas is becoming crucial.

Crisis management is an area, where not all obvious tightly managed information input streams are available for use, where the need to know and act is mixed and interfered with the standard human rights, citizen's freedom and business, where for the most of the time does not exist centralized command as in military environment and where many subjects, governed by their own, group, territorial and other aims live and act. One of the most important things to assure during the crisis situations is to have enough resources. Resources of various kinds – material, financial and also some special services.

The military approach to the logistics is in some way easier to accomplish – there is the centralized command, there are well-established messaging structures, there is an obligation and responsibility of each element in the command structure to follow the orders. There is also a system of planned resources, maintained by the military forces or government and dedicated fully just for their usage. In the civil crisis management there is not such a structure or obligations, in spite of this the command, which is taking over the management during the crisis, has to have resources available to save lives, properties and environment.

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**Standard Form 298 (Rev. 8-98)**
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In the "peace-time", i.e. the time when the region or country is not in the crisis situation, the government and civil organizations have obviously very loose tools for assuring some structured activities. There are only some rules defined by the legislation, which might determine the proper behaviour of various organizations, businesses and citizens in order to be prepared for crisis situations. There is also a factor of the minimization of cost for such an "insurance" of the society. The solution for that has been found in some countries – to minimize the volume of resources directly owned or financed by government and replace this system by the more effective one.

The new approach to crisis management resources planning takes into account the fact, that most of the resources needed to cope with the crisis situation are permanently present in the territory, used for the daily business of both public and private organizations. The base for this new approach is very simple – we could plan for the utilization of various resources that are in the territory during the crises, if we have information on them. This approach minimizes the need to stock a vast amount of material just for the purpose of crisis. The planning is accomplished in a sort of "virtual" and "fuzzy" environment, that is why a substantial information support is a must.

This is the purpose of the system **ARGIS**, which collects information about the various resources in the countrywide scale, having thousands of users in the public and private organizations and which gives the planners and crisis managers tools to fulfil their responsibilities. This system is designed to support planning and use of all available resources in the manufacturing environment in favor of fulfilling the government tasks. For ARGIS system development the modern information technologies have been used. The a goal was to simplify as much as possible the user access to the information, minimize the operation costs and open it for integration with other systems - local, regional and international. As some of the system features (especially the data gathering) are opened to the public, both information security and interoperability have been treated as important factors.

This approach requires, though, a corresponding legislation, which has been valid in the Czech Republic since the year 2000.

## Processes Supported by ARGIS

There are several basic processes needed for crisis management.

- Risk analysis
- Preparation of operation plans
- Resources planning
- Actual management of the specific crisis situation.

ARGIS supports the last three of them. The needs for resources to solve any specific crisis situation (flood, earthquake, epidemic, extensive black-out, extensive shortage of oil, monetary crisis, terrorist attack, …) result from operations plans. ARGIS allows summarizing the needs and balancing the resources found in the territory against the needs and report the deficits found to the higher level, up to the national bodies, responsible for the coverage of the whole country.

In the specific crisis situation, the information stored in ARGIS serves as a first point for the resources lookup, getting a fast response for the crisis management teams at various levels of country management.

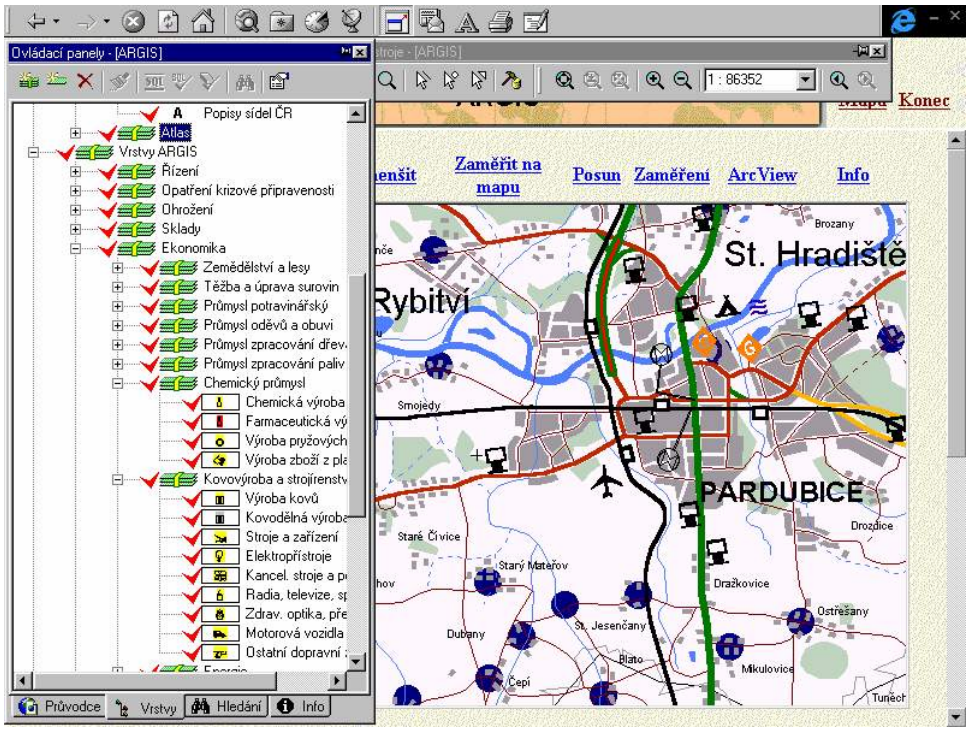
Besides organizational arrangements and standard operation procedures, material means and specific services there are needed during the crisis situation. We are talking about "Necessary Resources" which the government should have prepared in this case. These resources might be assured by the special arrangement at the specific supplier, or by addressing of supplier, which normally produces the requested commodity.

The government deals with the emergency states at the regional level, in case of large disasters or war situation at the central level. Then it needs to fulfill the role of coordinator of the activities. The philosophy of treating of reserves has changed from the simple stocking to the preserving and generating the flexible production of resources.

The activities mentioned require strong information support. Decision-making during the crisis is rather complicated process, carried under stress, with the extreme demand for quality and quantity of verified information. Uncertainty may have large negative consequences. For the qualified decision the crisis management authorities need to process large quantities of information, to sort, group and analyze the information by the current situation needs. This is a purpose of the countrywide information system ARGIS.

## GOALS OF THE SYSTEM AND IT BASIC FEATURES

The basic purpose of the system is a permanent collection and maintenance of the information on the resources, with all the linked information. This applies both to the resources maintained by the government for the war situations and any other resources placed on the territory, which belong for example to companies. ARGIS collects all the information describing the production capabilities and also the agreements or contracts with the state. The system filled by all this information eases the planning and utilization of resources. Regions are able to see both their own resources and the resources available in the neighboring regions.



Basic features of ARGIS system are:

- Gathering and permanent updating of information about resources in the countrywide scale.
- Searching for resources based on various criteria (types, properties, ownership, justification of use, geographic location, ...)
- Analytical functions for planning and optimization of the resources.

The system has been build based on the following criteria:

- Availability of the relevant information in the understandable and usable form.
  - Use of cumulative and vivid data (maps, schematics, plans, graphs, ...)
  - Permanent operation of information resources, system backups, information security
  - Ease of user operation
- Efficient system of collecting and updating of information
  - System approach - description of the overall strategy of information acquisition and usage of specialized tools for the selected user actions.
  - Standardization - use of standard indexes and formats as for example
    - Index of economic subjects
    - Standard Products Classification
    - Material Catalog of the Czech Army
    - Territorial ID Index
    - Countrywide index of streets and public places
    - Military and civilian maps background
    - etc.
  - Automatic replication of information with the central management. Automatic replication of information among the system nodes.
  - Information Security
- Support of interoperability of various organizations by cultivating of a common information culture and also by using interoperability standards as for example NATO STANAG5500 (ADatP-3) for the formatted messaging. This and other features allow using ARGIS even in the multinational environment for the cooperation in the area of resources management.

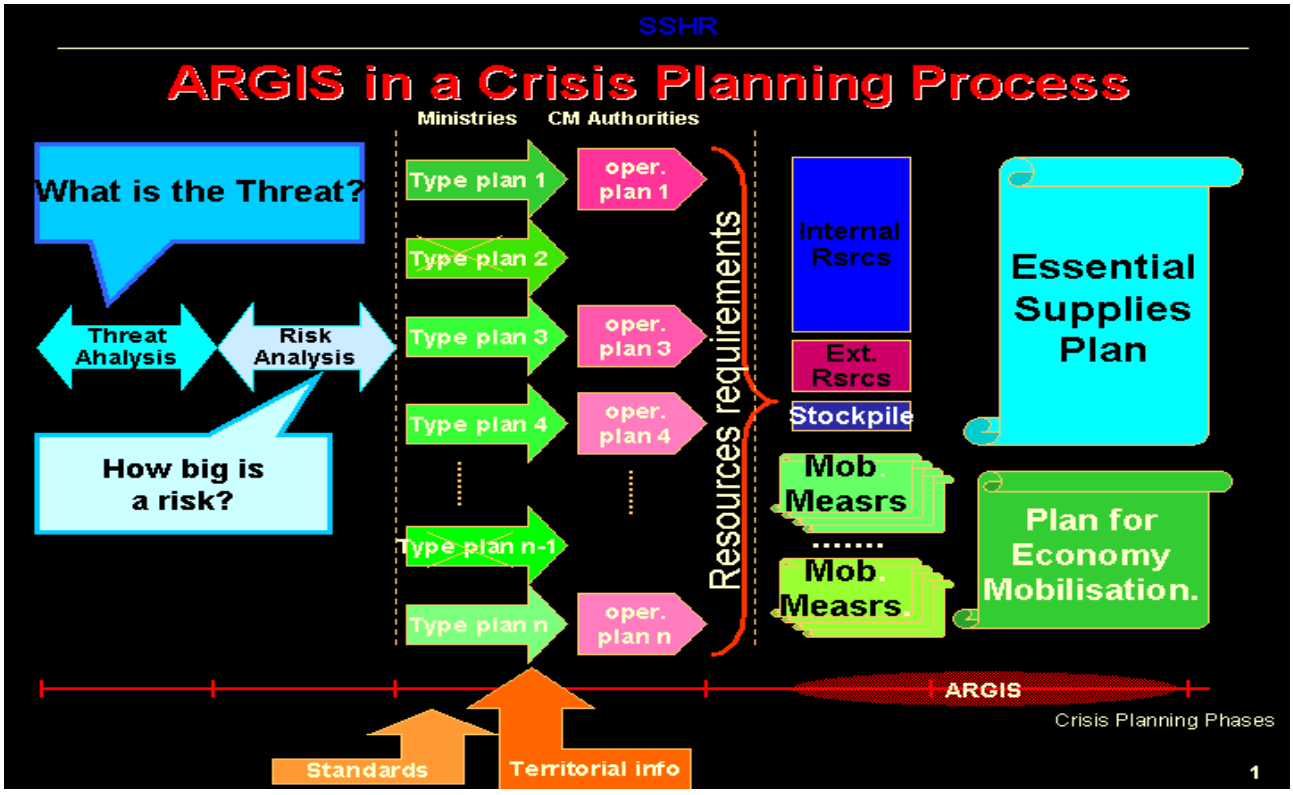
## ARGIS ARCHITECTURE

The system is centralized, but distributed for the operation continuity reasons (replicated servers for the case of network interruptions). ARGIS is available to all the government and municipal subjects, dealing with the crisis situations, to the operation centers and to the Central Crisis Staff, which is being activated in time of large disasters or similar crisis situations. It represents a specific resources monitoring system with the instant visualization of the geographical placement of resources of various kinds. It also supports the planning activities – the resources needs and balance evaluation etc.

ARGIS architecture is based on several premises

- Powerful, centralized and distributed web-based countrywide system.
- Automated collection system for easy gathering of information from the subjects, with the minimization of occurrence of errors.
- User interface based on maps with a simple geographical identification of resources, with the possibility of geographical analysis and internet-like user interface
- System interface, enabling working with multiple heterogeneous information resources (various maps, databases, sketches, tables, etc.), enabling also the automatic upgrading and maintenance of software.

The basic ARGIS placement in the crisis-management planning environment is on the following picture:




Base of ARGIS is so called Collector System, used for the permanent collection and update information. At the companies level the Collector is implemented as a special service (ladle), which is assigned by any regional office to a company or other resources provider. Each user is assigned a login and password and is able to begin the data input. The information is collected centrally at the main server of the State Administration of Material Resources and is immediately available to users at all levels.

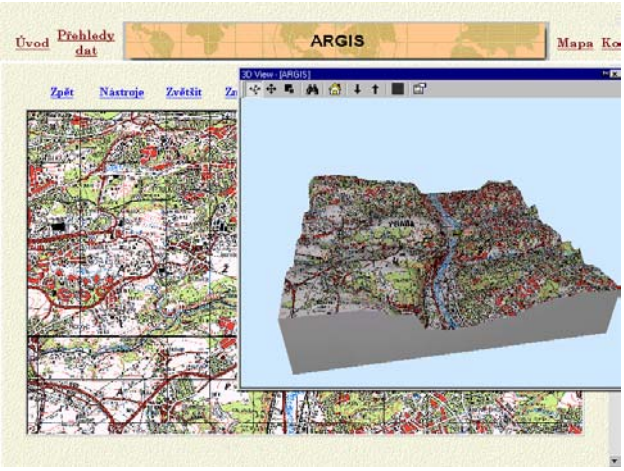
To the objects on the map any type of information including multimedia can be attached. Thus the picture of a building, plans, video sequences, specific charts, spreadsheets, text files and so on may be used. ARGIS is built to use as much as possible of COTS products and technologies.

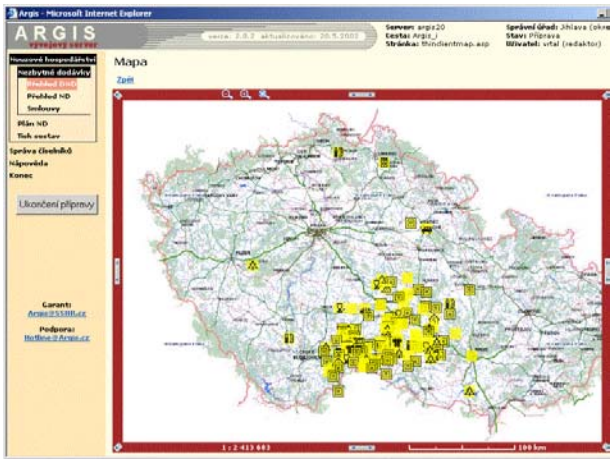
Information is assigned to various layers. These layers are possible to switch on and off separately. To the standard set of layers describing for example roads, rivers, forests, factories, etc. are associated special ARGIS layers describing the economy, based on the standard indexes.

Placing the query about for example cranes of a specific type, ARGIS brings the answer in the list of resources available and display their locations at the map. Similar request may be raised towards the sources of water, specialists and other resources.

### Maps and National Mapping Centre

One of the substantial features of the ARGIS system is the possibility to work with all digital maps available in the country, which are maintained by both government and military agencies. This is being accomplished by usage of the "National Mapping Center", which holds all the maps data in various layers and supplies them as a service over the net. The special set of symbols, maintained by the ARGIS management can easily depict the various kinds of resources at the territory as food, machinery, shelters, etc.




## COMMUNICATIONS AND SECURITY

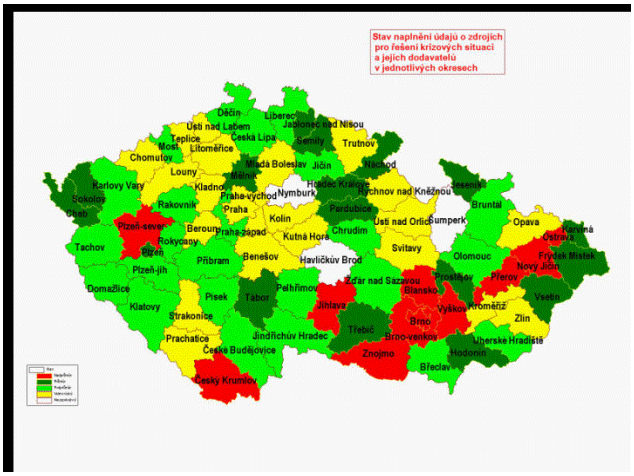
ARGIS operates over the encrypted Virtual Private Network with the information protection at both network and application levels. The usage of encrypted Virtual private network, enables to operate a data collection part over the Internet. This feature allows to handle the data input individually by each subject (companies, entrepreneurs, …), to keep the data actual and to decrease the operation costs and error level in the whole system.

There are various roles assigned to the users. On one side the basic set of functions assigned to the individual company and on the other side the full set of analysis functions over the whole country and the system management.

### The Information Inflow

As said, there is not the tight organizational structure behind crisis management during the "peace time" and also the information gathered for the purposes of planning and control is not exact and reliable. Even though the system represents a solid base for the planning and operational decision support.

At the beginning of the ARGIS usage the picture of the system fill up was as on the following picture. One very simple conclusion can be derived out of that – the quality of information is significantly better in the regions, which were hit by the floods in the years 1997 (eastern part of the country – Moravia).

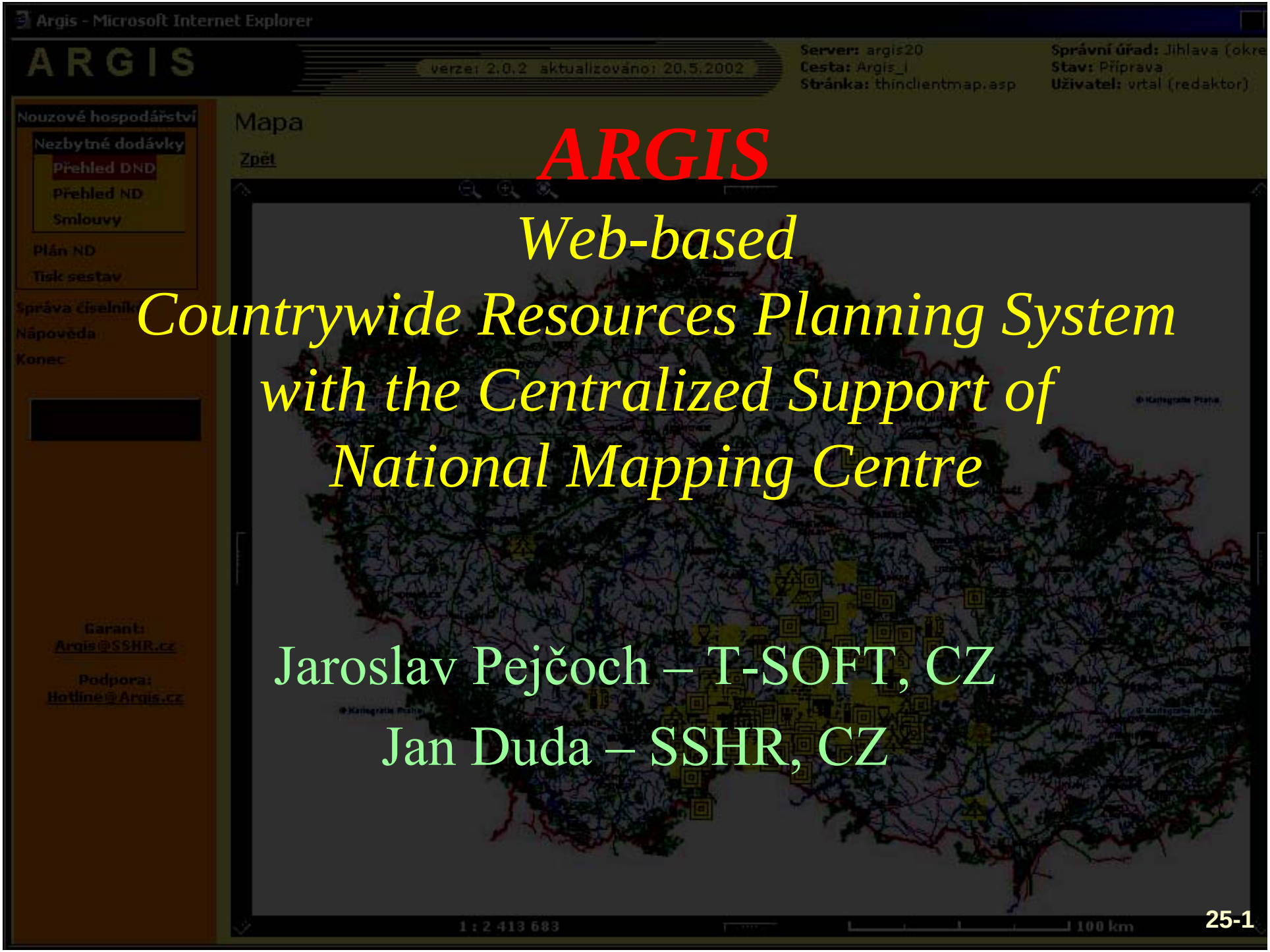



## CONCLUSION

System ARGIS represents a modern solution of a countrywide system for the management of information related to the emergency and crisis management. It covers automated data collection from the companies level up to the national center. ARGIS users are regional and national crisis planners and managers in various organizations. The new legislation rules were used to build the information source based on fuzzy information inflow and loose organizational structures in favor the support of crisis planning at the minimal costs.

Usage of Internet as a communication agent together with the encrypted Virtual Private Network technology bring down the operation costs, maintaining sufficient data security.

ARGIS assures the effective access to the relevant information not only in the crisis states, but also during all other emergencies.




# *ARGIS*

## *Web-based Countrywide Resources Planning System with the Centralized Support of National Mapping Centre*

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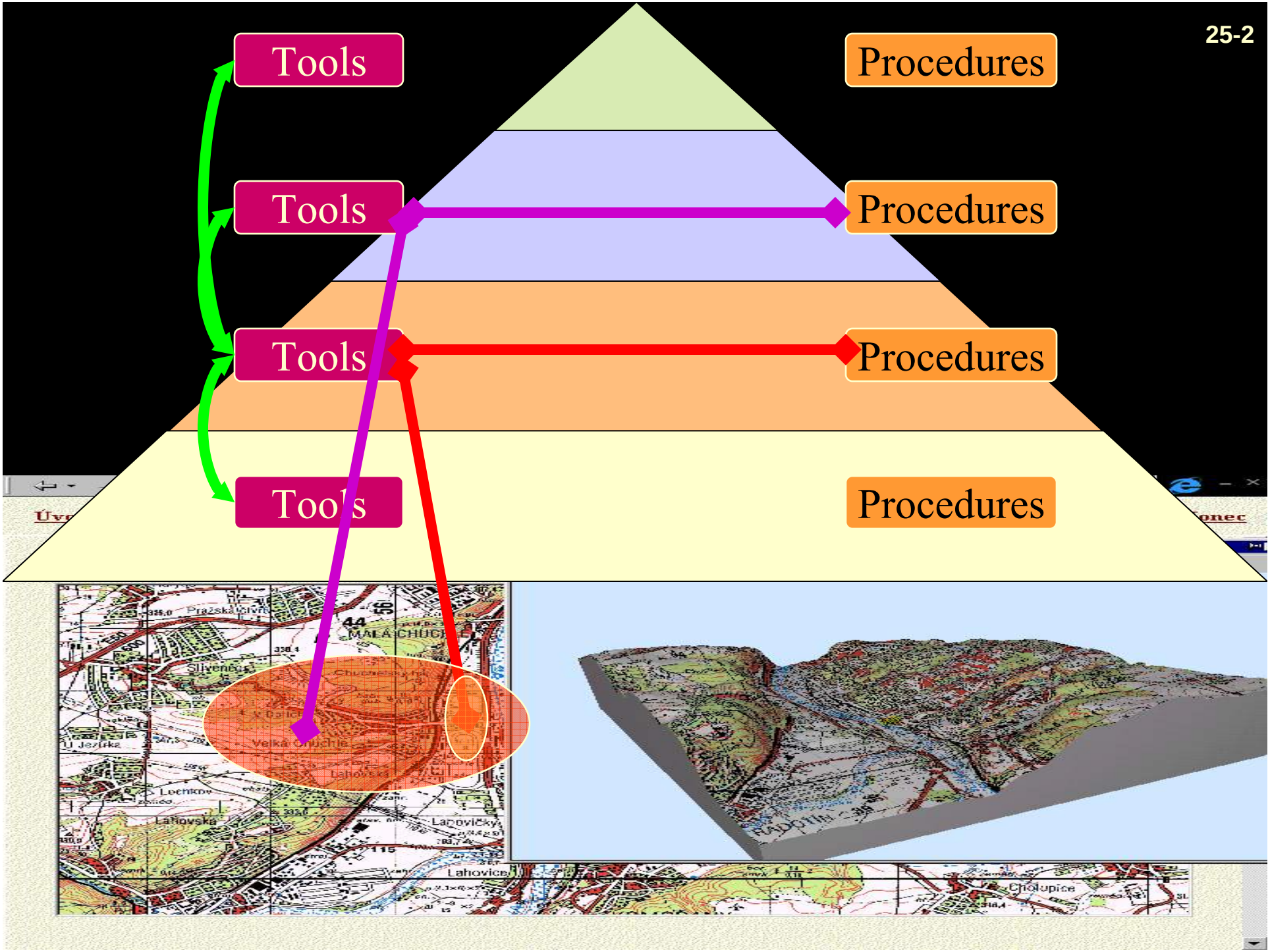
Jan Duda – SSHR, CZ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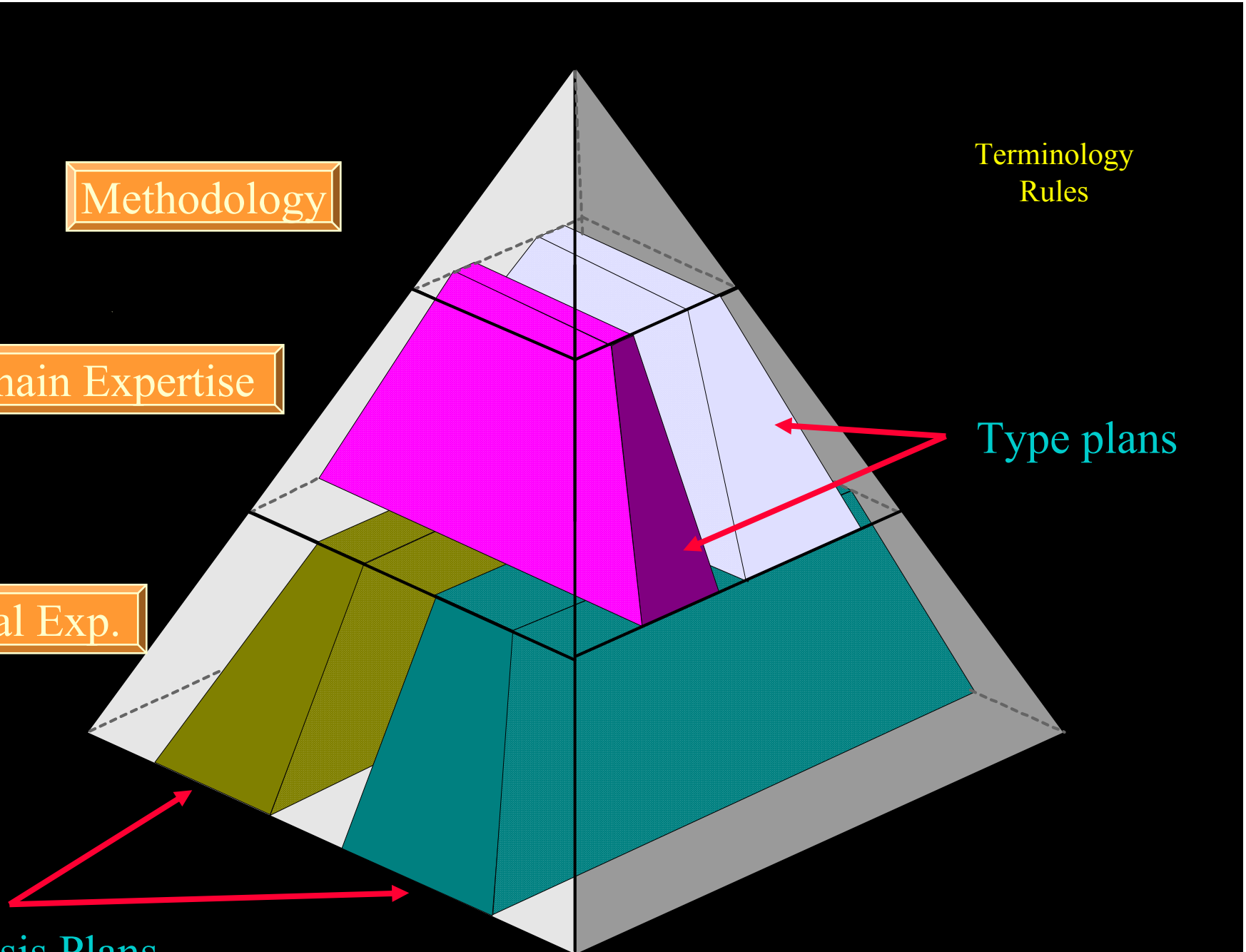
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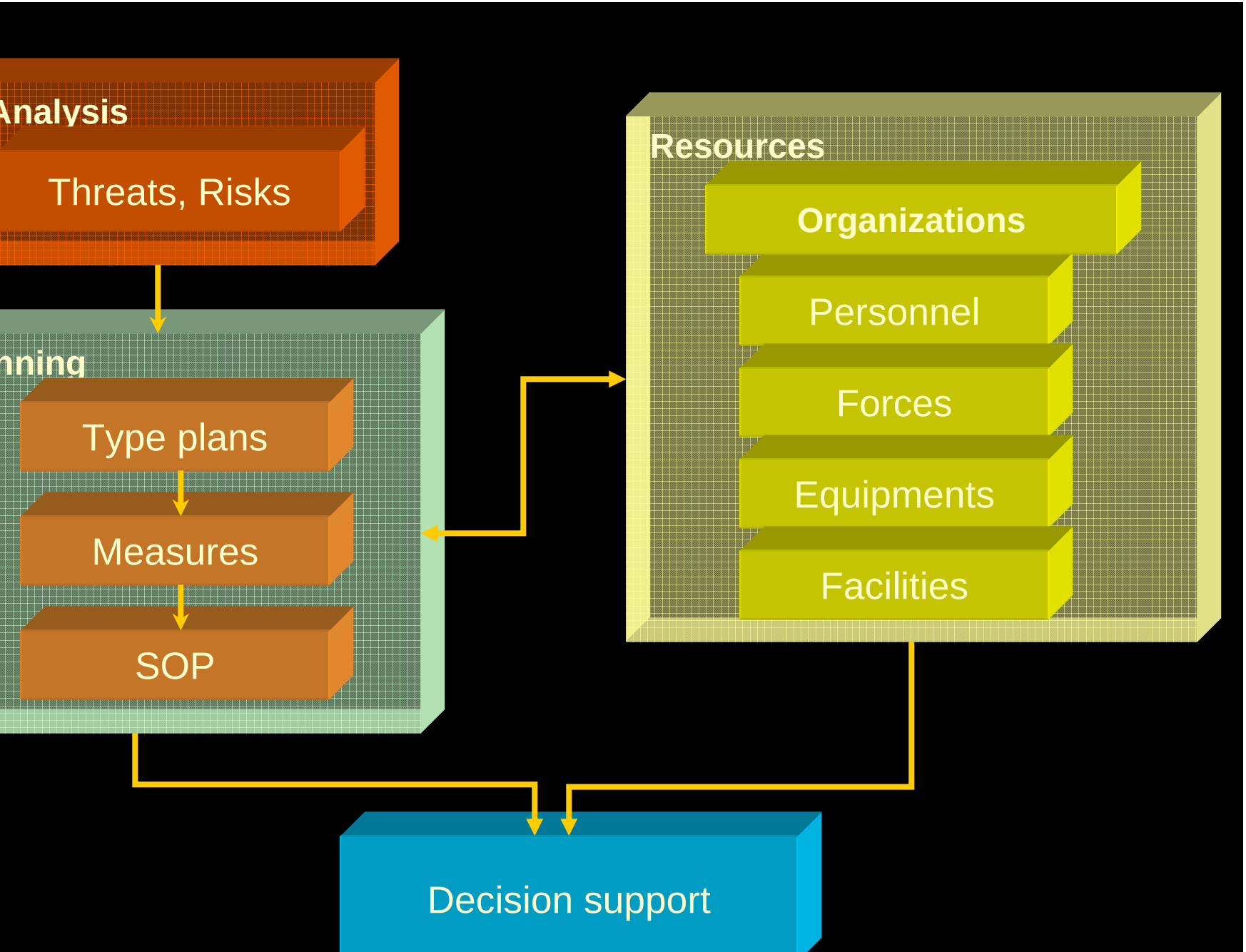
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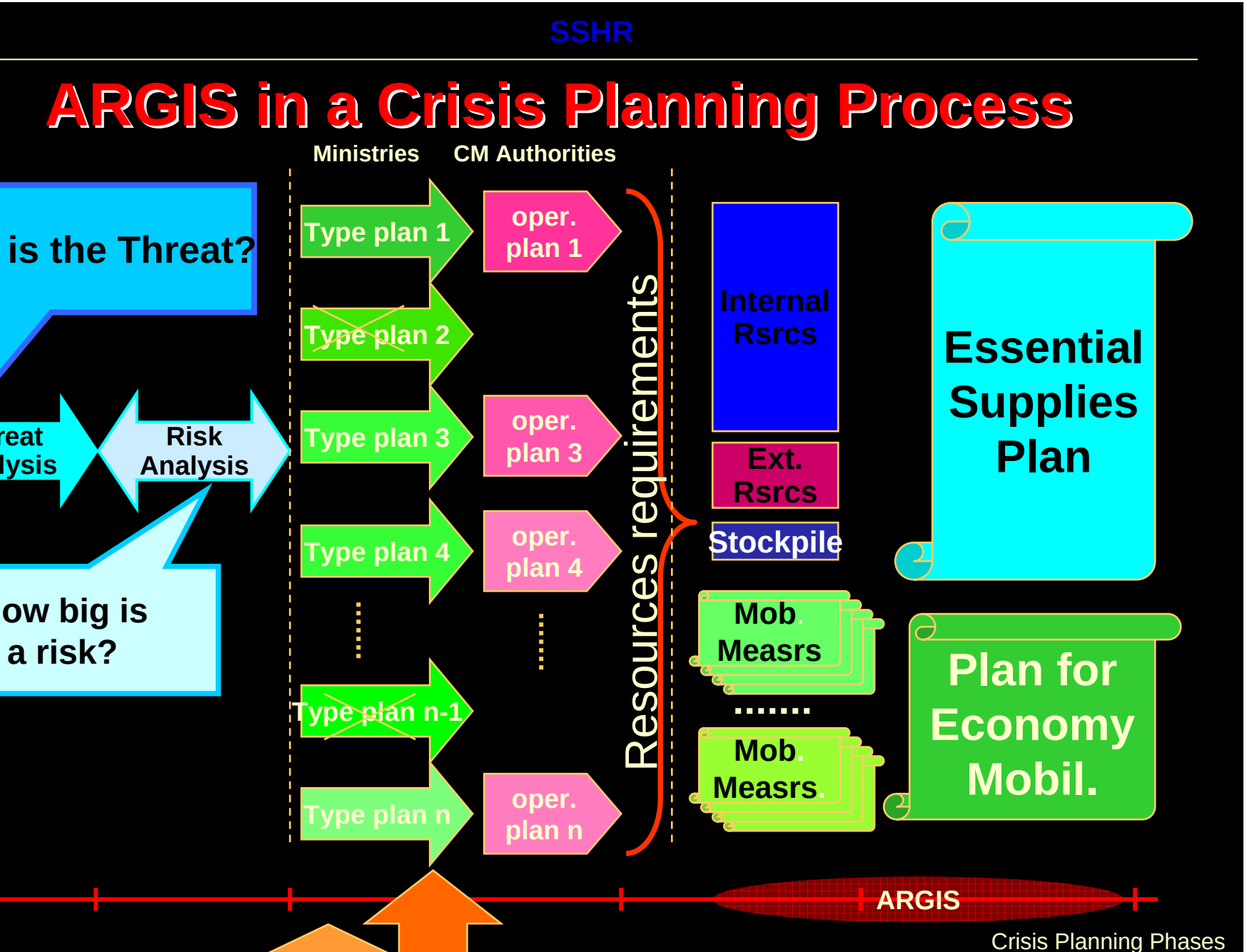
Resources
Organizations
Personnel
Forces
Equipments
Facilities
Decision support

# *Crisis Management Information*

- Tight/Loose information management
- Own/Virtual resources
- Command/Human rights, business

ARGIS
Risk Analysis
Preparation of operation plans
Resources planning
Actual management of the specific situation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Ext.
Rsrcs
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Essential
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Plan
Plan for
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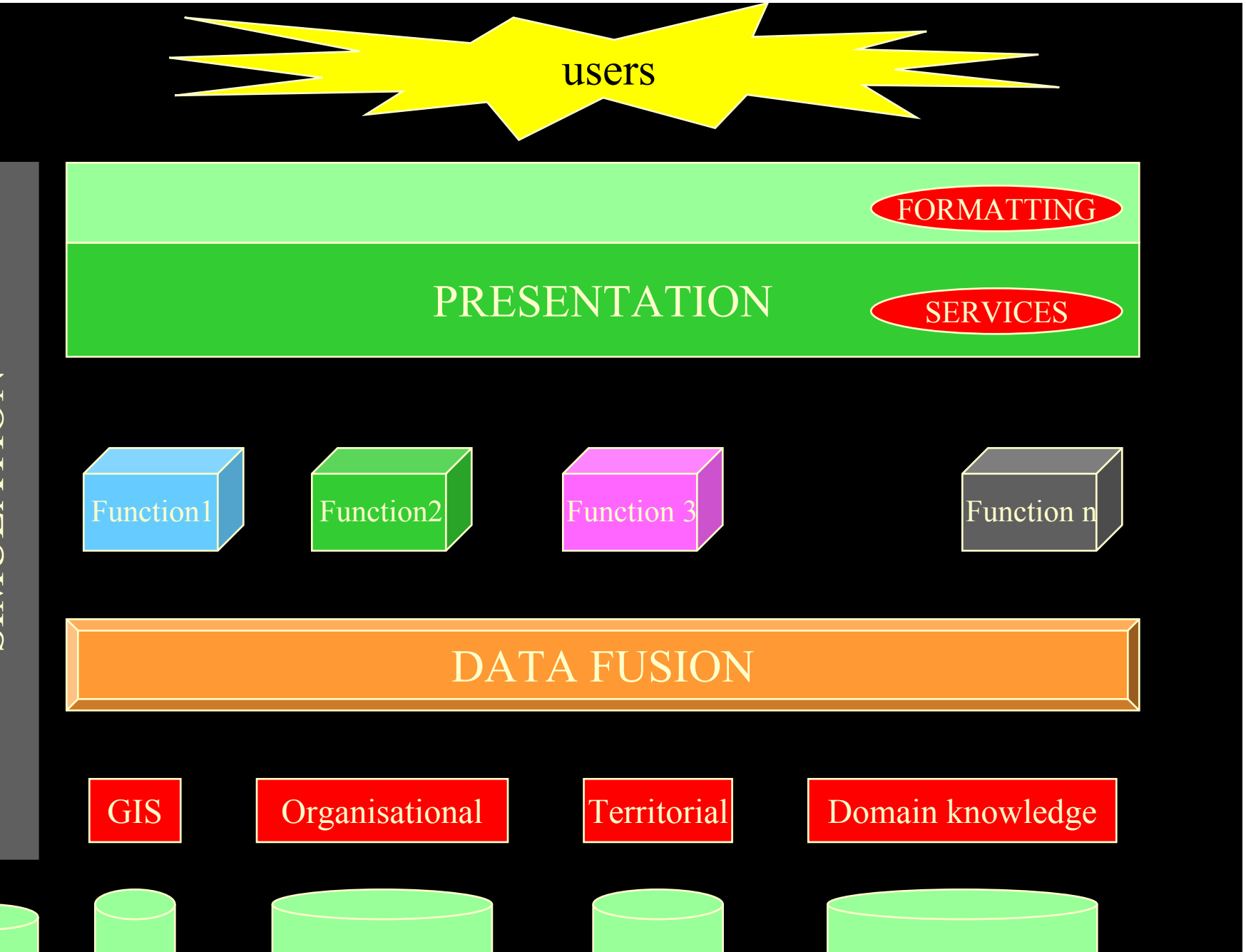
Mobil.
ARGIS
Crisis Planning Phases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DATA FUSION
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GIS
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verze: 2.0.2 aktualizováno: 20.5.2002

**Server:** argis20
**Cesta:** Argis_i
**Stránka:** thinclientmap.asp

**Správní úřad:** Jihlava (okre
**Stav:** Příprava
**Uživatel:** vrtal (redaktor)

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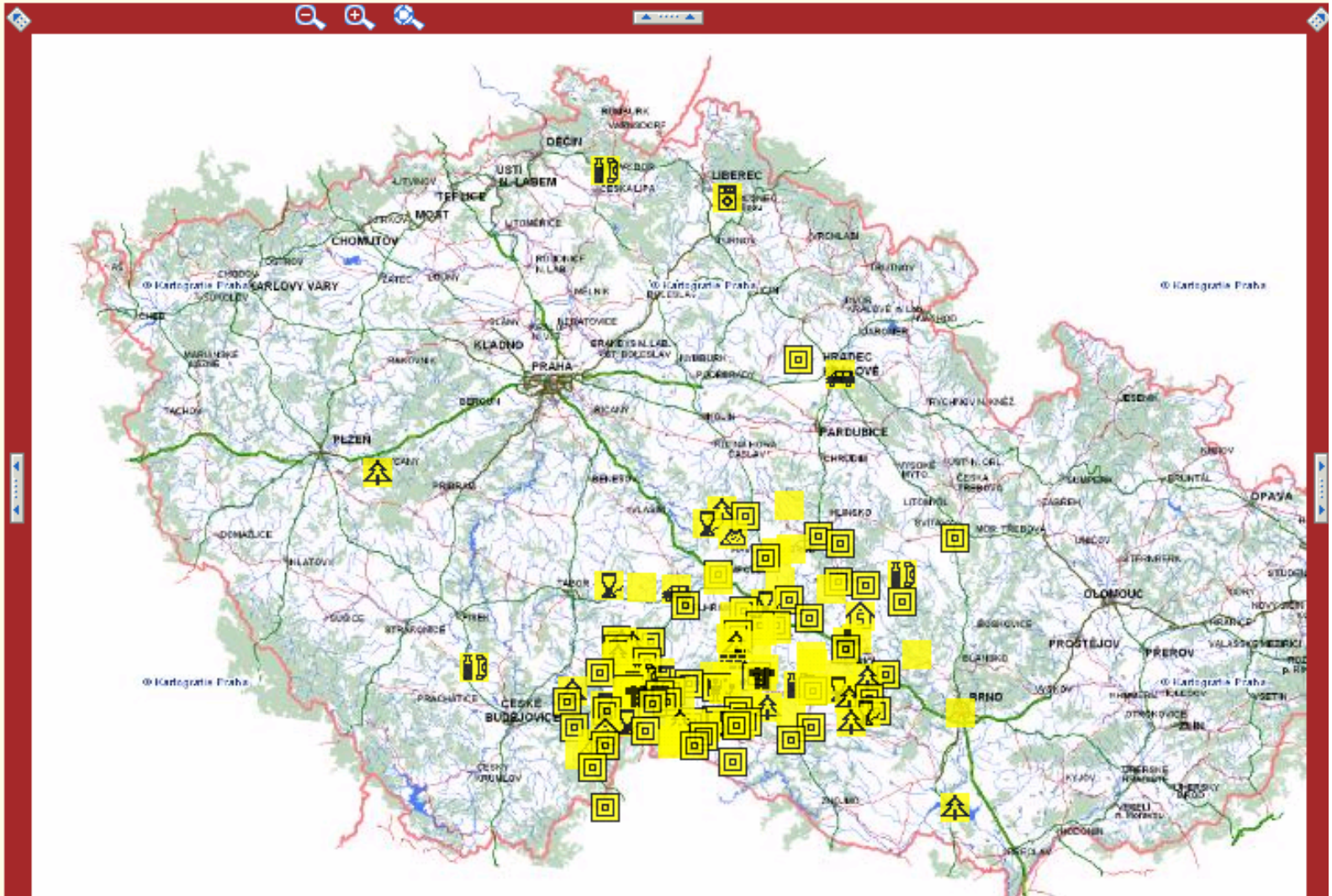
# Mapa

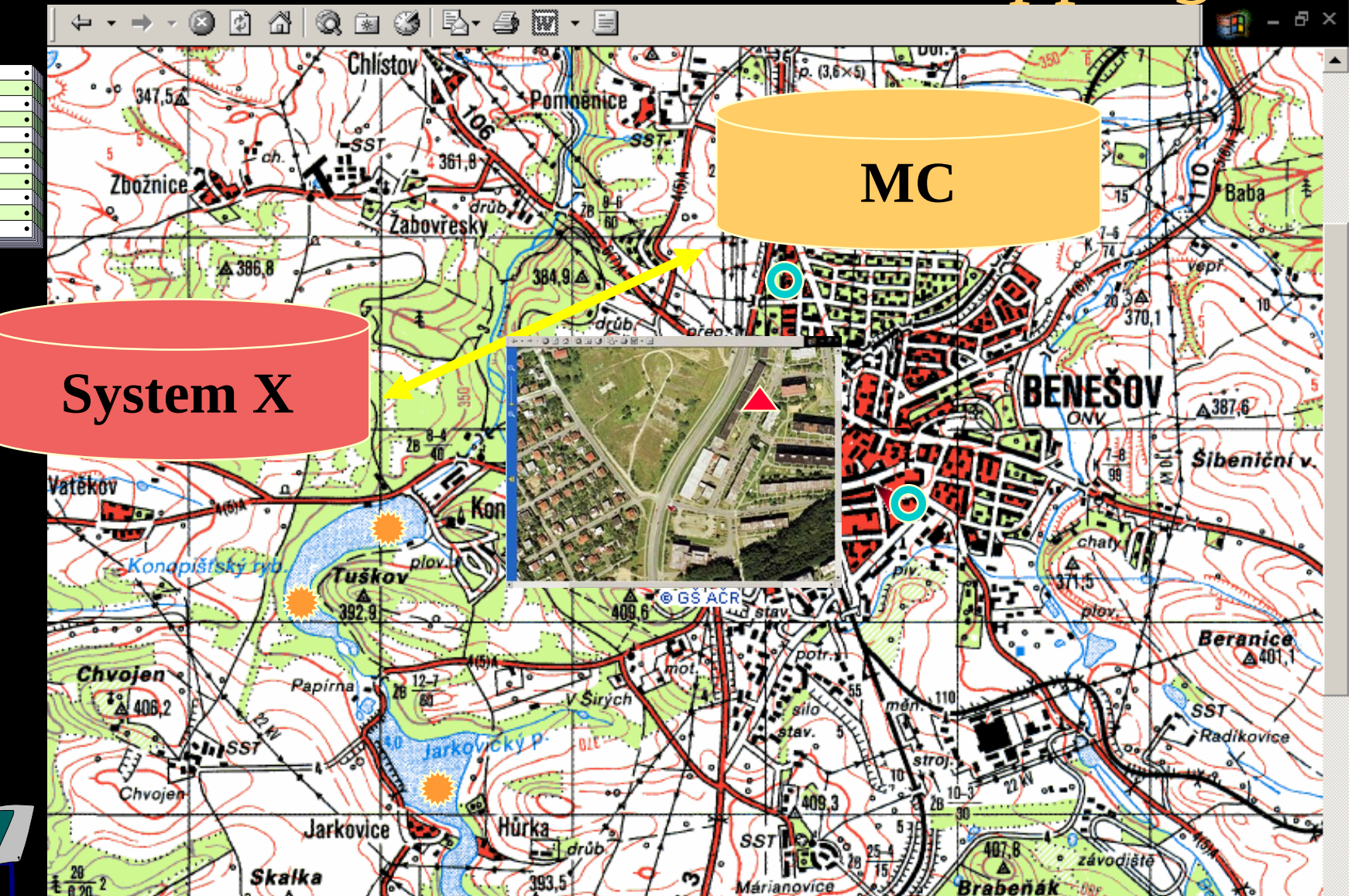
Zpět



# *ARGIS Features*

- Automated collection – web-based
- Map interface
- Secure
- Sustainability … replication

# *Mapping*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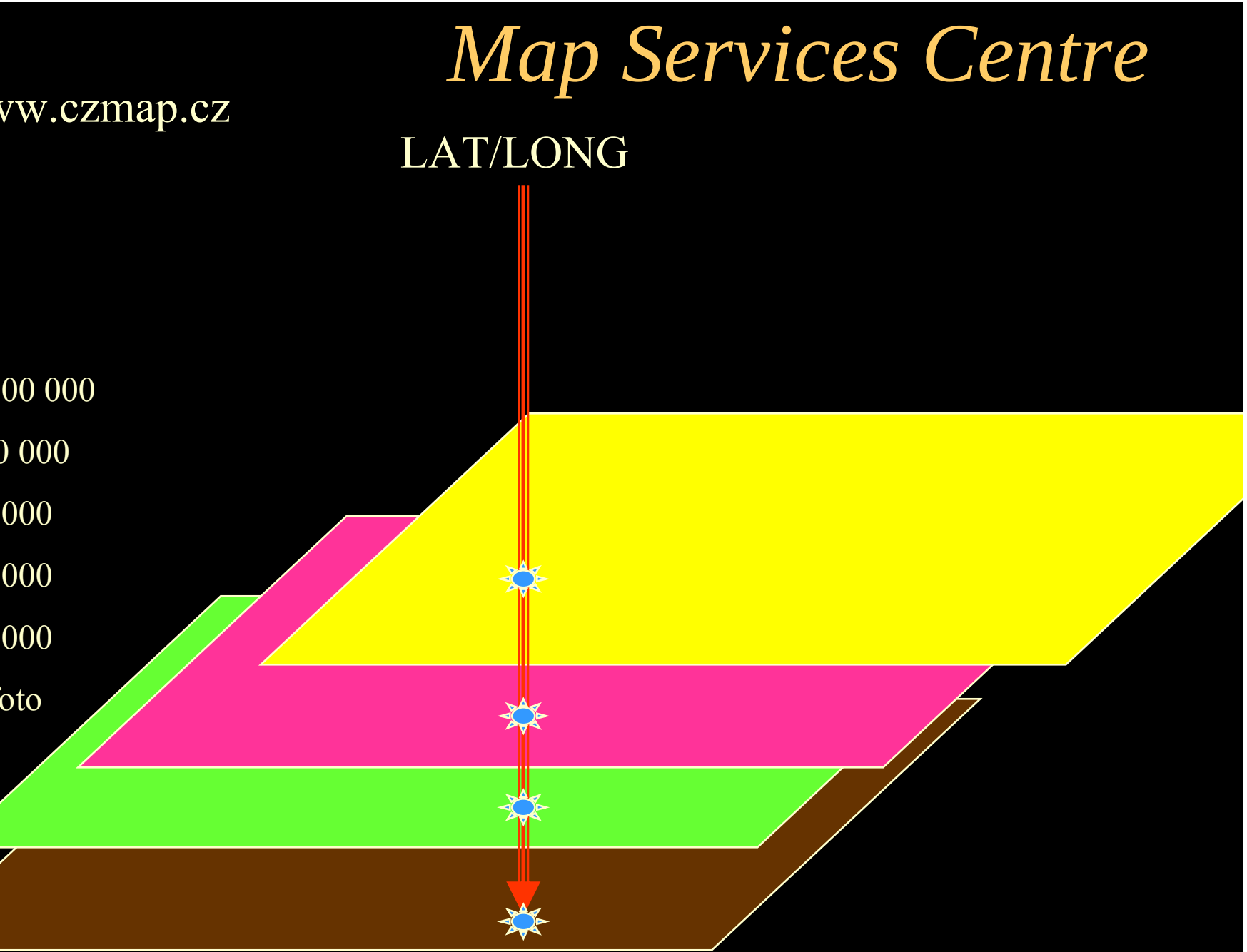
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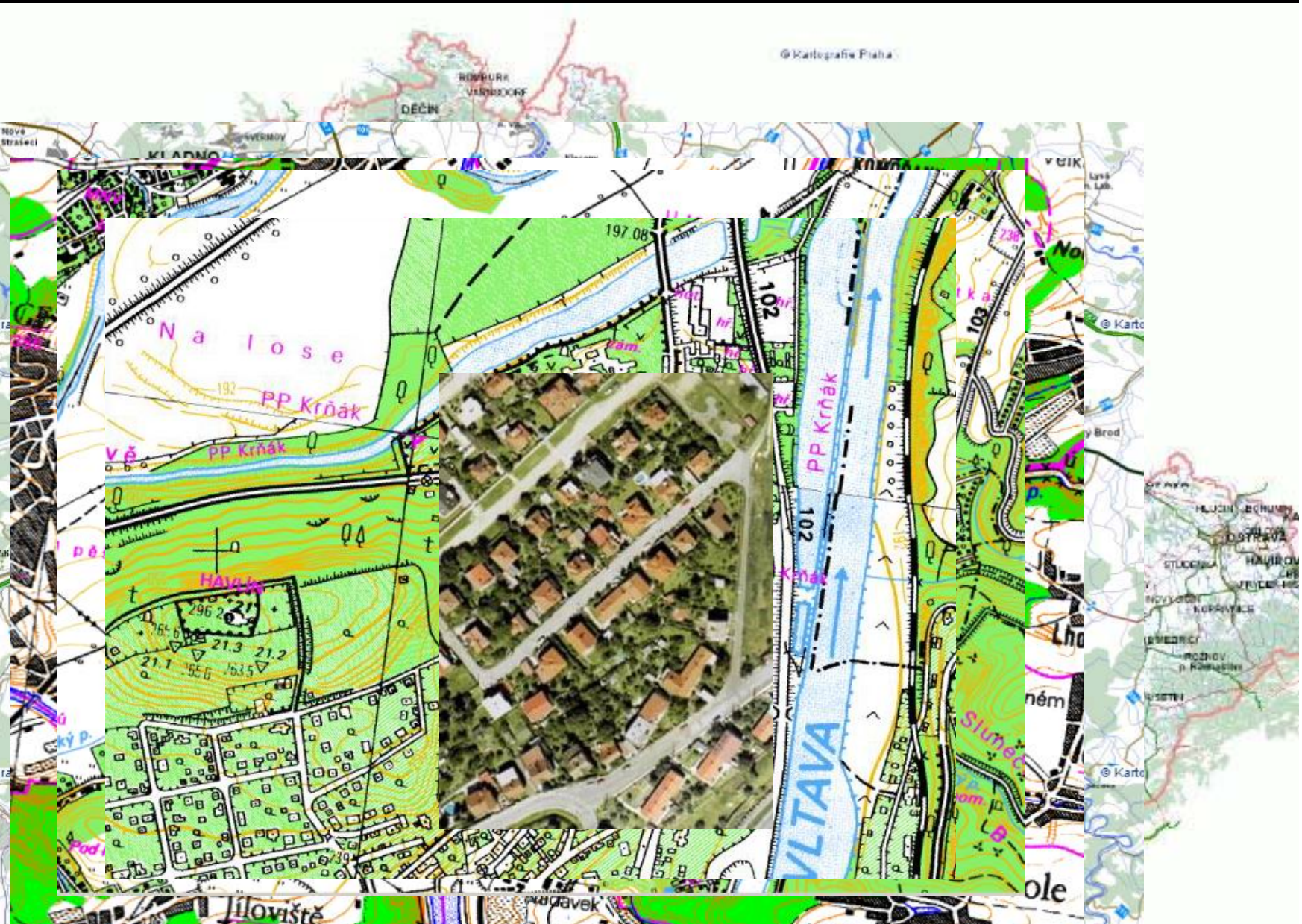

© Kartografie Praha
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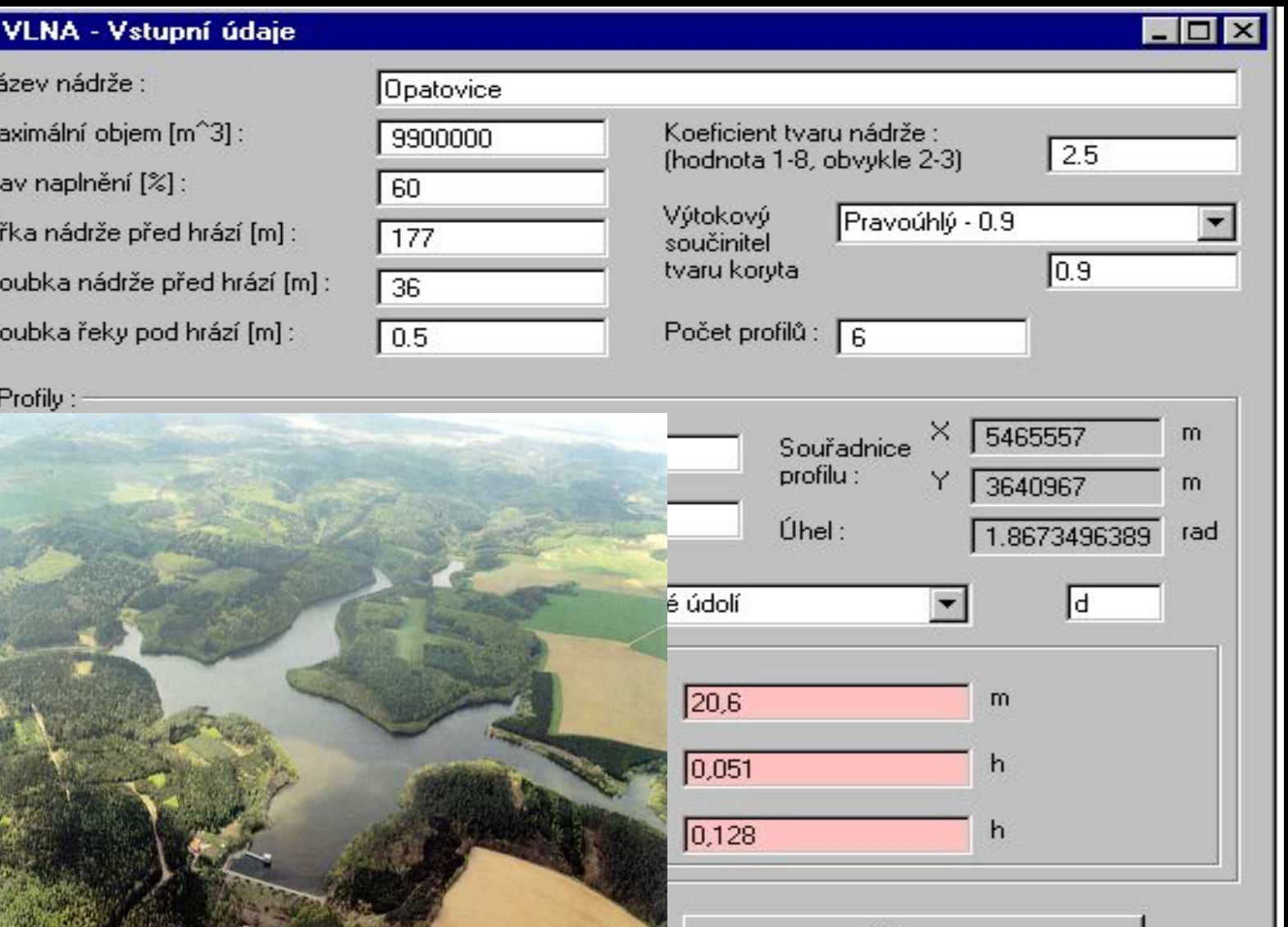
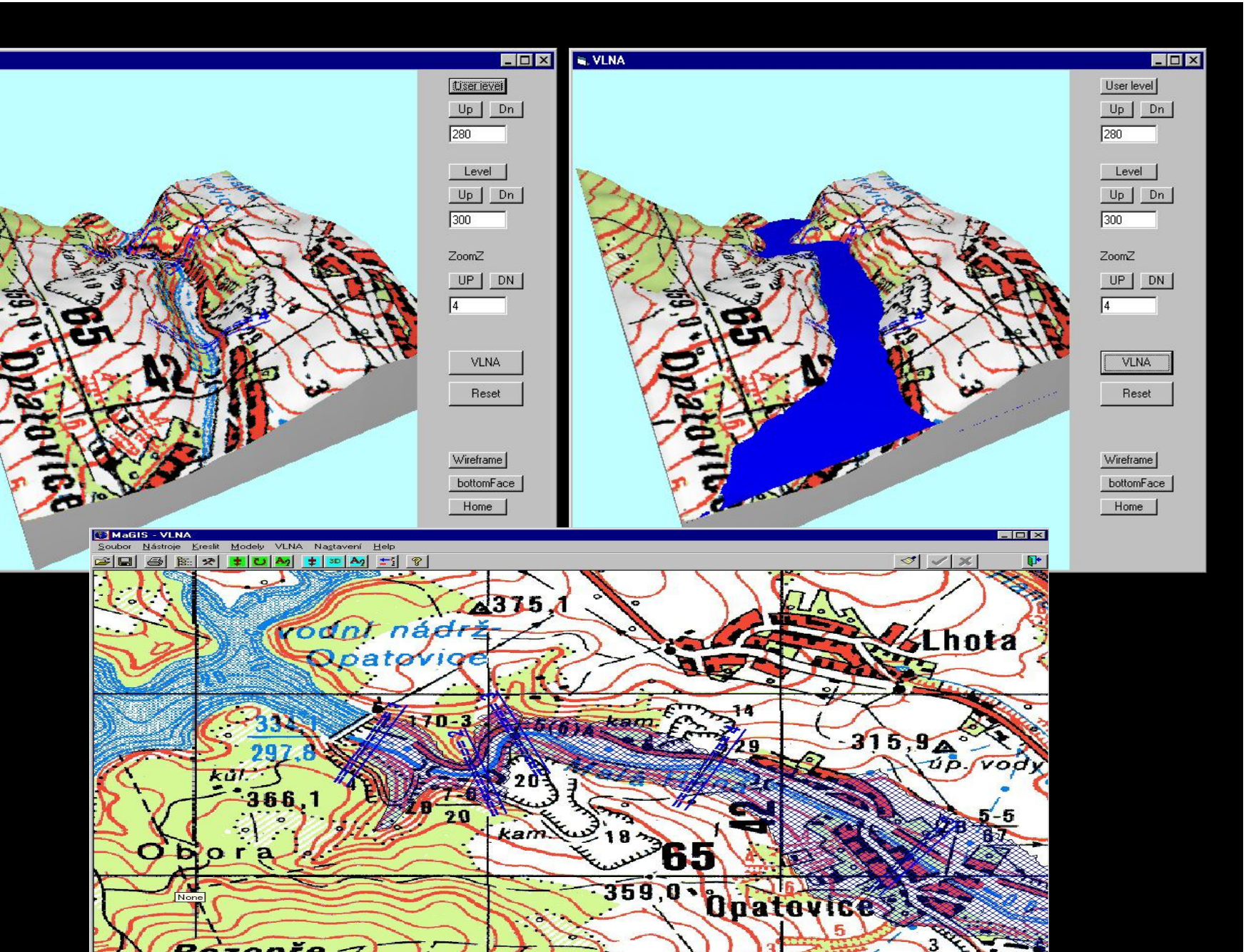
# VLNA (Wave) *Special floods*



Vlastnosti vlny v profilech




Skrýt okno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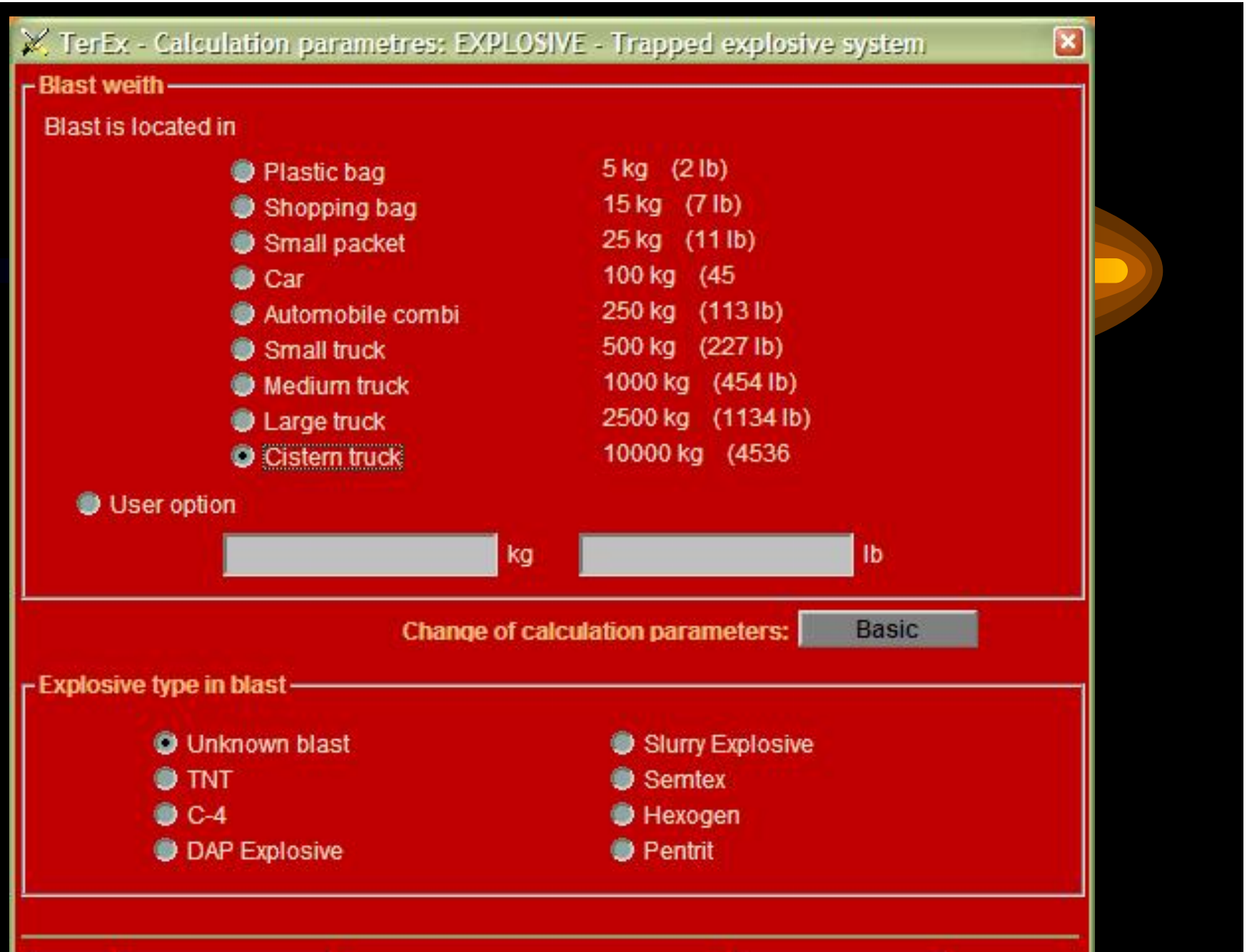
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Shopping bag 15 kg (7 lb)
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Large truck 2500 kg (1134 lb)
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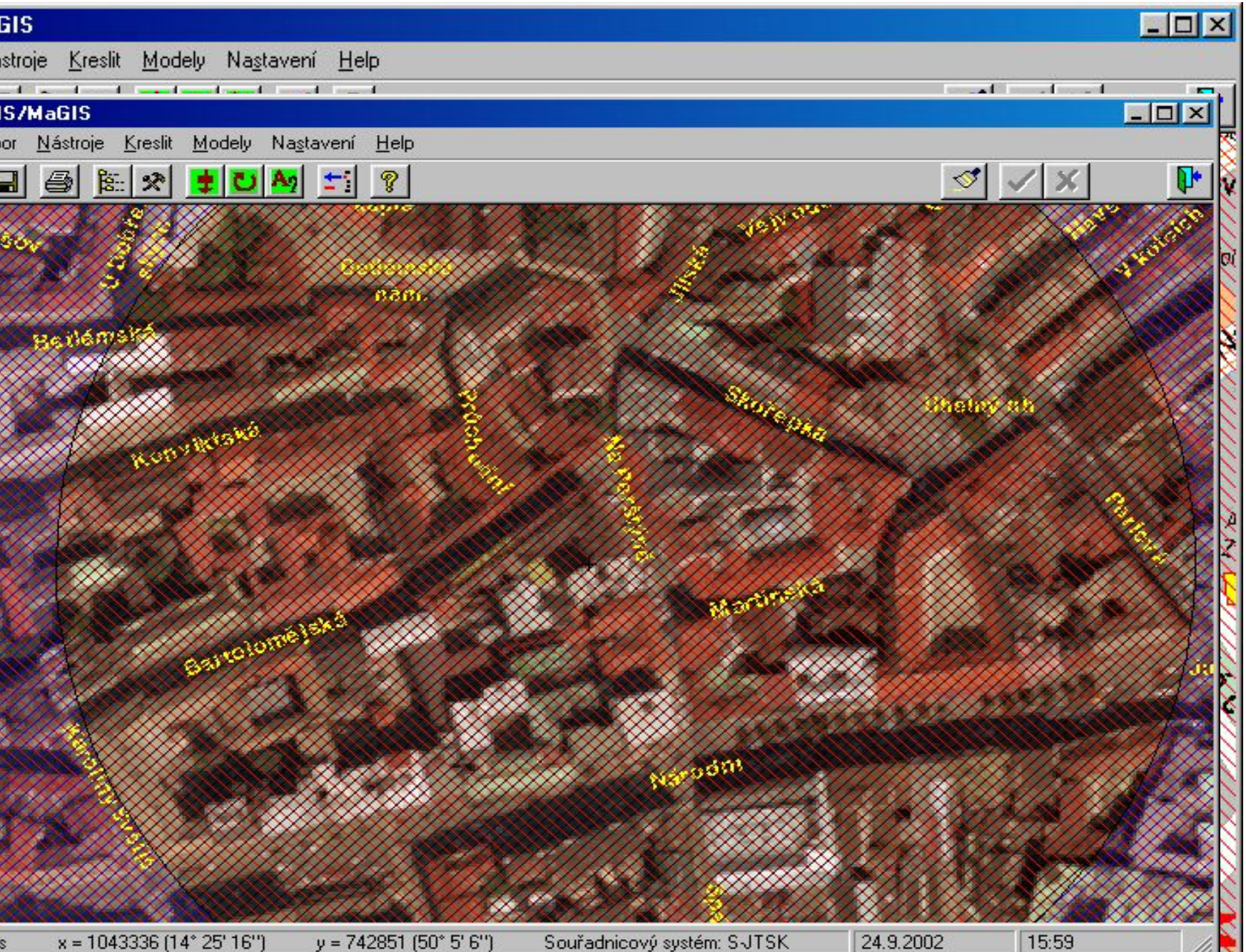
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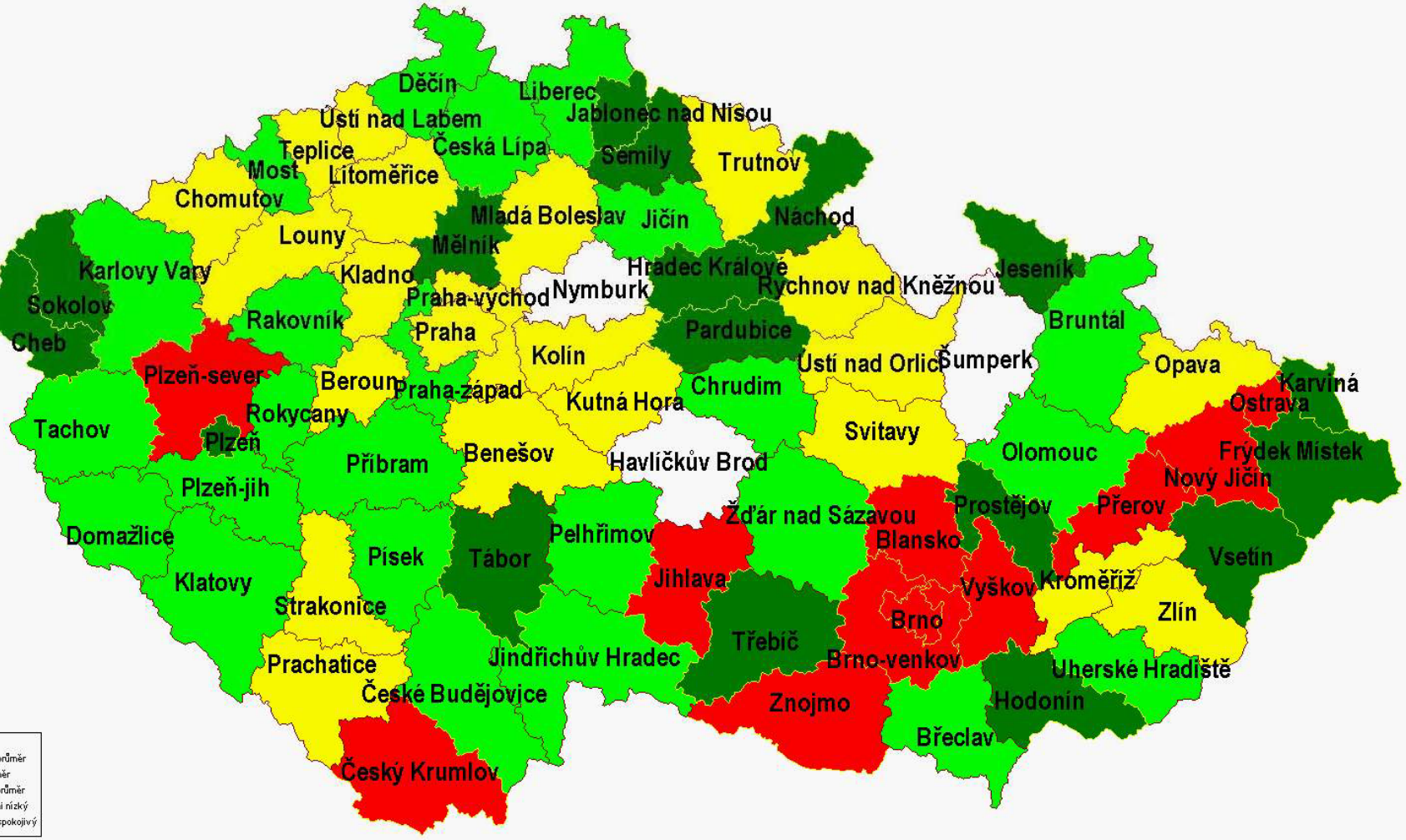
15:59

Stav naplnění údajů o zdrojích
pro řešení krizových situací
a jejich dodavatelů
v jednotlivých okresech